

CLAIMS

1. A substrate inspection device, for inspecting a substrate, comprising:
 - a substrate rotation device for holding a lower surface of a horizontal substrate from below on a holding surface and rotating about a rotational center axis oriented vertically;
 - a base, being a fundamental structure;
 - a disk, having a disk body rotatably supported on the base in a horizontal direction with the rotational center axis as a center and three lift cams respectively fixed at three places on a circumference on an upper side of the disk body and forming cam faces formed by inclined surfaces that are inclined downward in one rotation direction with the rotational center axis as a center; and
 - a lifter, having a lifter body with a support surface where a substrate can be mounted on an upper side and movably guided up and down on the base and restraining rotation, and three lifter driven sections that are members projecting downward toward and respectively fixed to three places on a circumference of the lifter body that has the rotational center axis as a center,
wherein lower sides of the three lifter driven sections are respectively brought into contact with the three cam faces, in a sliding manner at respective contact points, and
wherein if the contact points move to an upper side of the inclined surface the support surface becomes higher than the holding surface, while if the contact points move to a lower side of the inclined surface the support surface becomes lower than the holding surface.
2. The substrate inspection device of claim 1, wherein:
 - the cam faces are formed by an inclined surface and a horizontal surface connecting to the upper side end of the inclined surface, and
 - the contact points can move from the upper side of the inclined surface to the horizontal surface.

3. The substrate inspection device of claim 1, wherein:

the base has a base plate member that is a plate-shaped member made level at an upper surface, a base cylinder member that is a cylindrical member having a central axis oriented vertically, and a base positioning mechanism that can align the central axis of the base cylinder member with the rotational center axis, and
the disk body has a disk plate member, being a plate-shaped member, movably supported at three places on a circumference centered on the rotational center axis of a lower side in a horizontal direction on an upper surface of the base plate member, and three circumferential guides, fixed to the disk plate member and being members respectively brought into sliding contact with three places on the circumference of an outer surface of the base cylinder member.

4. The substrate inspection device of claim 3, wherein:

the substrate rotating device has a substrate holding member for holding a lower surface of a leveled substrate from below at a the holding surface, and a substrate holding base for rotatably supporting the substrate holding member turning around the rotational center axis, and
the base positioning mechanisms have a set screw for adjusting the size of a clearance between a side surface of the substrate holding base and an inner surface of the base cylindrical member.

5. The substrate inspection device of claim 1, wherein:

the lifter body has a lifter plate member with a support surface on which a substrate can be mounted on an upper side, being a plate member, and three wafer holders respectively arranged and fixed at three places on a circumference of the support surface of the lifter plate member with the rotational center axis as a center, and an edge of a substrate placed on the support surface contacts the three wafer holders from the circumference.

6. The substrate inspection device of claim 1, wherein:

the base has a base plate member that is a plate-shaped member made level at an upper surface, and three base vertical guides that are cylindrical members having a vertical central axis, and respectively fixed at three locations on the circumference on the upper side of the base plate member with the rotational center axis as a center, and

the lifter body has a lifter plate member with a support surface on which a substrate can be mounted on an upper side, being a plate member, and three lifter vertical guides, being cylindrical members each having a vertical central axis, respectively fixed at three places on the lifter plate member,

wherein one of the base vertical guides and the lifter vertical guides have hollow sections, while the others fit into the hollow sections, with the lifter being guided so as to move vertically on the base with restricted rotation.

7. A substrate inspection device, for adhering a droplet to a substrate and causing movement in order to inspect the substrate, comprising:

a substrate rotating device for holding a horizontal substrate and rotating about a rotational center axis oriented vertically;

a recovery tool having a cylindrical section with a central axis oriented vertically, having an internal space capable of accumulating a droplet, and

a drive unit capable of moving the recovery tool in a horizontal direction,

wherein the cylindrical section is provided at a side section with a groove extending horizontally to connect the internal space to atmospheric space, and

wherein when a droplet is accumulated in the internal space and the substrate is rotated, the drive unit is capable of holding the recovery tool so that a droplet exposed to the groove comes into contact with an edge of the substrate.

8. A substrate inspection device, for adhering a droplet to a substrate and causing movement in order to inspect the substrate, comprising:

a substrate rotating device for holding a horizontal substrate and rotating about a rotational center axis oriented vertically;

a recovery tool having a cylindrical section with a central axis oriented vertically, having an internal space capable of accumulating the droplet;

a drive mechanism capable of moving the recovery tool in a horizontal direction; and negative pressure maintaining means capable of maintaining pressure of the internal space at a pressure more negative than atmospheric pressure when liquid has been collected in the internal space,

wherein the cylindrical section is provided with a first through hole connecting the internal space to atmospheric space at a lower end, and

wherein when a droplet is accumulated in the internal space and the substrate is rotated, the drive mechanism is capable of holding the recovery tool so that a distance between the surface of the substrate and the lower end of the cylindrical section is kept constant.

9. The substrate inspection device of claim 8, wherein:

the circumference of an edge of the first through hole at the lower end of the cylindrical section forms an annular level surface.

10. The substrate inspection device of claim 8, wherein:

the cylindrical section is respectively provided at side sections with a plurality of second through holes having central axes that cross in the same direction with respect to the radial direction, and

the second through holes connect the internal space and the atmospheric space.

11. The substrate inspection device of claim 8, wherein:

the negative pressure maintaining means has a negative pressure pipe connecting to the internal space.

12. A recovery tool, for adhering a droplet to a substrate and causing movement in order to inspect the substrate, comprising:

a cylindrical section with a central axis oriented vertically, having an internal space capable of accumulating a droplet, wherein
the cylindrical section is provided at a side section with a groove extending horizontally to connect the internal space to atmospheric space.

13. A recovery tool, for adhering a droplet to a substrate and causing movement in order to inspect the substrate, comprising:

a cylindrical section with a central axis oriented vertically, having an internal space capable of accumulating the droplet, and
negative pressure maintaining means capable of maintaining pressure of the internal space at a pressure more negative than atmospheric pressure when a droplet has been accumulated in the internal space, wherein
the cylindrical section is provided with a first through hole connecting the internal space to atmospheric space at a lower end.

14. The recovery tool of claim 13, wherein:

the circumference of an edge of the first through hole at the lower end of the cylindrical section forms an annular level surface.

15. The recovery tool of claim 13, wherein:

the cylindrical section is respectively provided at side sections with a plurality of second through holes having central axes that cross in the same direction with respect to the radial direction, and
the second through holes connect the internal space and the atmospheric space.

16. The recovery tool of claim 13, wherein:

the negative pressure maintaining means has a negative pressure pipe connecting to the internal space.

17. A substrate inspection method, for adhering a droplet to a substrate and causing movement in order to inspect the substrate, comprising:

a substrate inspection device preparation step for preparing a substrate inspection device comprising:

a substrate rotating device for holding a horizontal substrate and rotating about a rotational center axis oriented vertically;

a recovery tool having a cylindrical section with a central axis oriented vertically , having an internal space capable of accumulating the droplet;

a drive mechanism capable of moving the recovery tool in a horizontal direction; and negative pressure maintaining means capable of maintaining pressure of the internal space at a pressure more negative than atmospheric pressure when liquid has been collected in the internal space,

wherein the cylindrical section is provided with a first through hole connecting the internal space to atmospheric space at a lower end, and

wherein when a droplet is accumulated in the internal space and the substrate is rotated, the drive mechanism is capable of holding the recovery tool so that a distance between the surface of the substrate and the lower end of the cylindrical section is kept constant;

a substrate setting step for setting the substrate in the substrate rotating device;

a solution dropping step for dropping a solution into the internal space;

a negative pressure maintaining step where the negative pressure maintaining means maintains pressure in an internal space at a more negative pressure than the atmospheric pressure; and

a substrate scanning step where the drive unit keeps a distance between the surface of the substrate and a lower end of the cylindrical section constant when the substrate is rotated.

18. The substrate inspection method of claim 17, wherein:

the substrate setting step comprises setting a substrate having a surface with hydrophilic properties with respect to the solution in the substrate rotating device.